Base Year: 1999 By: S. Claire

SOURCE INVENTORY

CATEGORIES #283, 284, 285

FUEL COMBUSTION - STATIONARY SOURCES
DOMESTIC NATURAL GAS - SPACE HEATING (283)
- WATER HEATING (284)
- COOKING (285)

1999 EMISSIONS

Introduction

These categories estimate the emissions resulting from the combustion of natural gas in the residential sector. Natural gas consists of a high percentage of methane (generally above 85 percent) and varying amounts of ethane, propane, butane, and inerts. The combustion of natural gas in the residential sector is broken down into three categories: Space Heating, Water Heating, and Cooking.

Design of residential boilers and furnaces generally resemble firetube type boilers with flue gas traveling through several channels or tubes with water or air circulated outside the channels or tubes.

Methodologies

Total natural gas usage for these categories was obtained from PG&E. This total usage was broken down into percentages based on information from the California Energy Commission.

The percent breakdown is as follows:

52.6% - Space Heating
34.8% - Water Heating
12.6% - Cooking

Emission factors for the three components of domestic natural gas combustion were obtained as follows:

For Category #283 (Space Heating), all factors came from EPA's AP-42, Table 1.4-1 (domestic and commercial boilers),

For Category #284 (Water Heating), particulate and SO_2 factors came from AP-42. Organic, NO_x and CO factors came from ARB's "Methods for Assessing Area Source Emissions in California", as developed by the American Gas Association.

For Category #285 (Cooking), particulate, organic and SO_2 factors came from AP-42. NO_X factor came from the ARB document noted above.

Values of emission factors in pounds per million cubic feet (lbs / Mil. Cu. Ft) of natural gas are shown below:

	Part	**Organics**	**NO_x**	**SO_2**	**CO**
Cat# 283	3.0	8.0	100.0	0.6	20.0
Cat# 284	3.0	1.7	126.0	0.6	13.2
Cat# 285	3.0	8.0	73.0	0.6	100.0

Monthly Variation and County Distribution

Natural gas usage data were provided by PG&E. The data include residential, commercial, and industrial gas usage by county and by month. For all counties except Solano and Sonoma, single data sets were provided for entire counties. (Information on Palo Alto's natural gas usage was obtained separately from the City of Palo Alto and was used together with PG&E's Santa Clara County values. This was done as the city obtained gas from a supplier other than PG&E. For Solano and Sonoma Counties, (both partially in the District), data summed for cities in the District were used. For Solano County, data used were for Benicia, Fairfield, Suison and Vallejo, For Sonoma County, data used were for Cotati, Petaluma, Rohnert Park, Santa Rosa, Sebastopol and Sonoma.

TRENDS

Historical and future projections were back-casted and projected using Household Population.

Control

The District adopted Regulation 9, Rule 6 on April 1, 1992 to control the amount of NOx emissions from natural gas fired water heaters. This rule has a control of 46% with a rule effectiveness of 94% reached by the year 2002.

COMMENTS AND RECOMMENDATIONS

More specific information on the gas split between "Space Heating", "Water Heating" and "Cooking" categories would improve the accuracy of the emission calculations.